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| | | | EXAMINER GRAYBILL, DAVID E | |
| | | | ART UNIT 2827 | PAPER NUMBER |

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/931,587

Applicant(s)

SALATINO ET AL.

Examiner

David E Graybill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) 12 and 40-62 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Applicant's election of the species of Figure 2, claims 1-10 and 13-39 in the paper filed on 7-30-3 is acknowledged. It is further noted that claim 11 reads on the species of Figure 2. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 29, the scope of the language "prior with the opening therein" is unclear because it appears to be contextually ungrammatical.

In the rejections *infra*, reference labels are generally recited only for the first recitation of identical elements.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 22-27, 29, 31, 33, 34, 37 and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Juskey (5177669).

At column 1, lines 31-55, and column 2, line 34 to column 4, line 11, Juskey teaches the following:

A method for making an integrated circuit (IC) package with an exposed portion of the IC, the method comprising: providing a mold including first 46 and second 40 mold portions, the first mold portion

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carrying a mold protrusion 48 defining an IC-contact surface; closing the first and second mold portions around the IC 12 to downset the IC under controlled pressure applied by the IC-contact surface to the IC; injecting encapsulating material 50 into the mold to make the IC package with the exposed portion adjacent the mold protrusion; and releasing the IC package from the mold, mounting the IC on a leadframe 30 having inherently resilient portions to resiliently accommodate downsetting of the IC as the IC-contact surface contacts the IC, wherein the resilient portions comprise die pad support bars 30 extending between a die pad 32 and adjacent finger portions 34, wherein downsetting inherently displaces the die pad below the finger portions, inherently shaping bond wires 18 between the IC and the outer finger portion so that upon downsetting the bond wires have a desired clearance from the IC and an upper surface of the encapsulating material, wherein the encapsulating material and the IC have different coefficients of thermal expansion (CTEs); wherein the encapsulating material is injected at an elevated temperature (above absolute zero); and further comprising relieving stress caused by the different CTEs as the IC and encapsulating material cool, wherein relieving stress comprises providing a leadframe having a die pad with an opening "aperture" therein, and mounting the IC on the die pad prior with the opening therein prior to closing the first and second mold portions around the IC, wherein the exposed portion of the IC

comprises upper surface portions with active devices formed therein, wherein the mold protrusion comprises a resilient material.

A method making an integrated circuit (IC) package with an exposed portion of the IC, the method comprising: providing a mold including first and second mold portions, the first mold portion carrying a mold protrusion defining an IC-contact surface; mounting the IC on a lead frame having a die pad with an opening therein; closing the first and second mold portions around the IC and leadframe; injecting encapsulating material into the mold at an elevated temperature to make the IC package with the exposed portion adjacent the mold protrusion; and releasing the IC package from the mold, wherein the exposed portion of the IC comprises upper surface portions with active devices formed therein, the mold protrusion comprises a resilient material.

To further clarify the teaching wherein downsetting inherently displaces the die pad below the finger portions, it is noted that Juskey teaches that the die pad is below the finger portions; the elastomeric protrusion "bears upon the active surface 15 of the die and is compressed" and "presses or bears against the active surface," and further teaches that the first member 42 is "elastomeric" and creates "compliance." Therefore, it is inherent that the protrusion presses the elastomeric first member into downward compliance through displacement and downsetting of the die and

attached die pad, and that this displacement occurs below the finger portions.

To further clarify the teaching of inherently shaping bond wires between the IC and the outer finger portion so that upon downsetting the bond wires have a desired clearance from the IC and an upper surface of the encapsulating material, it is noted that Juskey teaches shaping bond wires between the IC and the outer finger portion so that the bond wires have a desired clearance from the IC and an upper surface of the encapsulating material, and this process inherently occurs during the downsetting described supra.

Claims 28 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey (5177669) as applied to claims 27 and 34.

Juskey does not appear to explicitly teach as the invention wherein relieving stress comprises using a low stress encapsulating material.

Still, as cited, Juskey teaches as conventional relieving stress using a low stress encapsulating material made by "[reducing] the expansion coefficient [of the material] to more closely approximate that of the silicon IC." Furthermore, it would have been obvious to use the conventional low stress encapsulating material as the encapsulating material of Juskey because it would reduce stress.

Claims 30 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey (5177669) as applied to claims 29 and 34, and further in combination with applicant's admitted prior art.

Although, as cited, Juskey teaches mounting the IC on the die pad with the opening therein by adhesively securing the IC on the die pad, Juskey does not appear to explicitly teach wherein relieving stress further comprises using a low stress, low modulus adhesive.

Notwithstanding, in the specification, at page 14, lines 25-32, applicant teaches as conventional a low stress, low modulus die attach adhesive "Ablebond 8340." In addition, it would have been obvious to use the conventional die attach adhesive as the die attach adhesive of Juskey because it would provide the die attach adhesive of Juskey, and use of a known element based on its suitability for its intended use has been held to be prima facie obvious. See MPEP 2144.07.

To further clarify the teaching that Ablebond 8340 is prior art, the teaching that this trademarked product was known or used by others in this country as of the filing date of the instant application is prima facie evidence that it is prior art.

Claims 32 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey (5177669) as applied to claims 31 and 37, and further in combination with Glenn (6143588).

Juskey does not appear to explicitly teach wherein the active devices define a sensor.

Nonetheless, as cited, Juskey teaches that the devices define an integrated circuit, for example, an EPROM, and at column 1, lines 28-36, Glenn teaches wherein devices define integrated circuits including an EPROM or a sensor. In addition, it would have been obvious to substitute the sensor of Glenn for the EPROM of Juskey, because it would provide a low stress sensor package.

Claims 22 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamiyama (JP4-354341).

In the English abstract and figures, Kamiyama teaches the following:

A method for making an integrated circuit (IC) package with an exposed portion of the IC, the method comprising: providing a mold including first 2 and second 4 mold portions, the first mold portion carrying a mold protrusion 22 defining an IC-contact surface; closing the first and second mold portions around the IC 32 to downset the IC under controlled pressure applied by the IC-contact surface to the IC; injecting encapsulating material 28 into the mold to make the IC package with the exposed portion adjacent the mold protrusion; and releasing the IC package from the mold, mounting the IC on a leadframe 30 having resilient portions "leads" to

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resiliently accommodate downsetting of the IC as the IC-contact surface contacts the IC.

Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama as applied to claims 22 and 23, and further in combination with Chua (5789806).

As cited, Kamiyama teaches shaping bond wires "leads" between the IC and the outer finger portion so that upon downsetting the bond wires have a desired clearance from the IC and an upper surface of the encapsulating material.

However, Kamiyama does not appear to explicitly teach wherein the resilient portions comprise die pad support bars extending between a die pad and adjacent finger portions, and wherein downsetting displaces the die pad below the finger portions.

Nevertheless, at column 2, line 66 to column 4, line 26, Chua teaches wherein resilient portions comprise die pad support bars 46 extending between a die pad 32 and adjacent finger portions 34, and wherein downsetting displaces the die pad below the finger portions.

Moreover, it would have been obvious to combine the teaching of Chua with the teaching of Kamiyama because, as taught by Chua, it would provide IC support and a highly advantageous leadframe.

Claims 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama and Chua as applied to claims 24-26, and further in combination with Eguchi (5712507).

Kamiyama teaches wherein the encapsulating material is inherently injected at an elevated (above absolute zero) temperature.

However, Kamiyama and Chua do not appear to explicitly teach wherein the encapsulating material and the IC have different coefficients of thermal expansion (CTEs); and further comprising relieving stress caused by the different CTES as the IC and encapsulating material cool, wherein relieving stress comprises providing a leadframe having a die pad with an opening therein, and mounting the IC on the die pad prior with the opening therein prior to closing the first and second mold portions around the IC.

Regardless, at column 1, lines 25-55, and column 4, lines 32-43, Eguchi teaches wherein the encapsulating material 12 and the IC 10 have different coefficients of thermal expansion (CTEs); and further comprising relieving stress caused by the different CTES as the IC and encapsulating material cool, wherein relieving stress comprises providing a leadframe having a die pad 11a with an opening therein 11i, and mounting the IC on the die pad prior with the opening therein prior to encapsulation.

Furthermore, it would have been obvious to combine the teaching of Eguchi with the teaching of Kamiyama and Chua because it would improve package reliability.

Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama, Chua and Eguchi as applied to claims 27 and 29, and further in combination with applicant's admitted prior art.

Kamiyama, Chua and Eguchi do not appear to explicitly teach wherein relieving stress comprises using a low stress encapsulating material, and wherein relieving stress further comprises mounting the IC on the die pad with the opening therein by adhesively securing the IC on the die pad using a low stress, low modulus adhesive.

Notwithstanding, in the specification, at page 14, lines 13-32, applicant teaches as conventional using a low stress encapsulating material "mold compound sold under the designation Plaskon SMT-B1-LV," and a low stress, low modulus die attach adhesive "Ablebond 8340." In addition, it would have been obvious to substitute the conventional encapsulant and die attach adhesive for the encapsulant and die attach adhesive of the applied prior art because substitution of a known element based on its suitability for its intended use has been held to be prima facie obvious. See MPEP 2144.07.

To further clarify the teaching that Plaskon SMT-B1-LV and Ablebond 8340 are prior art, the teaching that these trademarked products were known or used by others in this country as of the filing date of the instant application, is prima facie evidence that they are prior art.

Claims 1-11, 13, 15, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey (5177669) as applied to claims 22-27, 29, 31, 33, 34, 37 and 39, and further in combination with Sono (5703398).

As cited, Juskey teaches the following:

A method for making an integrated circuit (IC) package with an exposed portion of the IC, the method comprising: providing a mold including first and second mold portions, the first mold portion carrying a mold protrusion defining an IC-contact surface with peripheral edges; closing the first and second mold portions around the IC and injecting encapsulating material into the mold to form the IC package with the exposed portion adjacent the mold protrusion; and releasing the IC package from the mold, wherein the mold protrusion has a generally rectangular shape, controlling pressure applied by the IC-contact surface to the IC when the first and second mold portions are closed around the IC, wherein controlling pressure comprise providing the mold protrusion comprising a resilient material, wherein controlling pressure comprises mounting the IC on a leadframe having resilient portions to resiliently accommodate downsetting of the IC as

the IC-contact surface contacts the IC, wherein the resilient portions comprise die pad support bars extending between a die pad and adjacent finger portions, wherein downsetting displaces the die pad below the finger portions, shaping bond wires between the IC and the finger portions so that upon downsetting the bond wires have a desired clearance from the IC and an upper surface of the encapsulating material, mounting the IC on a substrate 32 prior to closing the first and second mold portions, wherein the encapsulating material and the IC have different coefficients of thermal expansion (CTEs); wherein the encapsulating material is injected at an elevated temperature; and further comprising relieving stress caused by the different CTES as the IC and encapsulating material cool, wherein relieving stress comprises providing a leadframe having a die pad with an opening therein, and mounting the IC on the die pad prior with the opening therein prior to closing the first and second mold portions around the IC, wherein the exposed portion of the IC comprises upper surface portions with active devices formed therein, wherein the first and second mold portions each inherently comprises rigid material.

To further clarify the teaching that the first and second mold portions inherently comprise rigid material, it is noted that it is inherent that the mold portions are rigid enough to retain a space 47 for molding.

However, Juskey does not appear to explicitly teach a bleed-through retention channel positioned inwardly from the peripheral edges that retains encapsulating material bleeding beneath the peripheral edges of the IC contact surface, wherein said bleed-through retention channel extends adjacent at least a portion of an entire extent of the peripheral edges of the contact surface, and wherein said bleed-through retention channel extends adjacent an entire extent of the peripheral edges of the contact surface.

Notwithstanding, at column 6, lines 41-43, and column 7, lines 12-20 and 46-55, Sono teaches a bleed-through retention channel 74 or 84 positioned inwardly from mold portion 70 or 81 peripheral edges that retains encapsulating material "resin" bleeding beneath the peripheral edges of the mold portion contact surface (the mold portion surface contacting the plate 28 or 29), wherein said bleed-through retention channel extends adjacent at least a portion of an entire extent of the peripheral edges of the contact surface, and wherein said bleed-through retention channel extends adjacent an entire extent of the peripheral edges of the contact surface.

In addition, it would have been obvious to combine the bleed-through retention channel with the mold of Juskey because it would prevent resin from bleeding as taught as desirable by both Juskey "prevent flashing" and Sono.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey and Sono as applied to claim 13.

Juskey does not appear to explicitly teach as the invention wherein relieving stress comprises using a low stress encapsulating material.

Still, as cited, Juskey teaches as conventional relieving stress using a low stress encapsulating material made by "[reducing] the expansion coefficient [of the material] to more closely approximate that of the silicon IC." Furthermore, it would have been obvious to use the conventional low stress encapsulating material as the encapsulating material of Juskey because it would reduce stress.

Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey and Sono as applied to claim 15, and further in combination with applicant's admitted prior art.

Although, as cited, Juskey teaches mounting the IC on the die pad with the opening therein by adhesively securing the IC on the die pad, Juskey does not appear to explicitly teach wherein relieving stress further comprises using a low stress, low modulus adhesive.

Notwithstanding, in the specification, at page 14, lines 25-32, applicant teaches as conventional a low stress, low modulus die attach adhesive "Ablebond 8340." In addition, it would have been obvious to use the conventional die attach adhesive as the die attach adhesive of Juskey

because it would provide the die attach adhesive of Juskey, and use of a known element based on its suitability for its intended use has been held to be prima facie obvious. See MPEP 2144.07.

To further clarify the teaching that Ablebond 8340 is prior art, the teaching that this trademarked product was known or used by others in this country as of the filing date of the instant application is prima facie evidence that it is prior art.

Also, the combination of Juskey and Sono does not appear to explicitly teach periodically cleaning the mold and the mold protrusion.

Nevertheless, at page 15, line 31 to page 16, line 3, and page 15, lines 5-10, applicant teaches as conventional periodically cleaning a mold. Additionally, it would have been obvious to periodically clean the mold and the mold protrusion of the applied prior art because it would facilitate encapsulating.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey and Sono as applied to claim 17, and further in combination with Glenn (6143588).

Juskey does not appear to explicitly teach wherein the active devices define a sensor.

Nonetheless, as cited, Juskey teaches that the devices define an integrated circuit, for example, an EPROM, and at column 1, lines 28-36,

Glenn teaches wherein devices define integrated circuits including an EPROM or a sensor. In addition, it would have been obvious to substitute the sensor of Glenn for the EPROM of Juskey, because it would provide a low stress sensor package.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Juskey, Sono and Glenn as applied to claim 18, and further in combination with applicant's admitted prior art.

Although, as cited, the combination of Juskey, Sono and Glenn teaches wherein the active devices define a fingerprint sensor, it does not appear to explicitly teach wherein the active devices define an electric field fingerprint sensor.

Nonetheless, in the specification, at page 2, lines 17-20, applicant teaches as conventional wherein active devices define an electric field fingerprint sensor. Furthermore, it would have been obvious to use the conventional fingerprint sensor as the fingerprint sensor of the applied prior art because it would provide a fingerprint sensor, and substitution of a known element based on its suitability for its intended use has been held to be prima facie obvious. See MPEP 2144.07.

The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

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Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to Group 2800 Customer Service whose telephone number is 703-306-3329.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947, or after about 02/05/04, (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is (703) 872-9306.



David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
28-Nov-03